Journal of the OPTICAL SOCIETY *of* AMERICA

BOARD OF EDITORS

WALLACE R. BRODE, *Editor*

Term ending December 31, 1951

BRUCE H. BILLINGS — G. R. HARRISON
W. E. FORSYTHE — R. A. SAWYER
K. S. GIBSON — E. D. TILLYER
G. H. GLIDDON — NORMAN WRIGHT
H. W. LEVERENZ

Term ending December 31, 1953

MAX HERZBERGER — PARRY MOON
HERBERT E. IVES — HANS MUELLER
DEANE B. JUDD — GEORGE WALD
DAVID L. MACADAM — MARY WARGA
GLENN A. FRY

Term ending December 31, 1955

B. H. CARROLL — R. C. LORD
A. C. HARDY — W. F. MEGGERS
E. O. HULBURT — J. R. NIELSEN
L. A. JONES — BRIAN O'BRIEN
S. S. BALLARD

VOLUME 41, NUMBERS 1-12, 1951

Published for the
OPTICAL SOCIETY OF AMERICA
by the
AMERICAN INSTITUTE OF PHYSICS
Incorporated

THE OPTICAL SOCIETY OF AMERICA

Officers of the Society

WILLIAM F. MEGGERS, *President*
National Bureau of Standards
Washington 25, D. C.

BRIAN O'BRIEN, *Vice President*
Institute of Optics
University of Rochester
Rochester 3, New York

ARTHUR C. HARDY, *Secretary*
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

W. W. GRAEPER, *Treasurer*
Bausch & Lomb Optical Company
Rochester 2, New York

WALLACE R. BRODE, *Editor*
National Bureau of Standards
Washington 25, D. C.

STANLEY S. BALLARD, *Secretary for Local Sections*, Tufts College,
Medford 55, Massachusetts

RUDOLF KINGSLAKE, *Past President*
Eastman Kodak Company
Rochester 4, New York

The Board of Directors consists of the above officers and four directors-at-large.

Directors-at-Large

A. H. BENNETT
American Optical Company

E. H. LAND
Polaroid Corporation

JOHN STRONG
Johns Hopkins University

MARY WARGA
University of Pittsburgh

Local Sections

Rochester Section

JAMES R. BENFORD, *President*
HAROLD R. CONDIT, *Vice President*
STEPHEN M. MACNEILLE, *Secretary*
GORDON G. MILNE, *Treasurer*

Detroit Section

FORD R. BRYAN, *Chairman*
WILLIAM R. O'NEILL, *Vice Chairman*
DANIEL L. HARMON, *Secretary*
MARGARET E. GRIFFING, *Treasurer*

Niagara Frontier Section

ERNEST SCHUSTIK, *President*
TRUMBULL S. JACKSON, *Secretary*
JOHN T. WALLER, *Treasurer*

Ohio Valley Section

C. H. ANESHANSLEY, *Chairman*
R. S. LAMBERT, *Chairman-Elect*
CHARLES S. MILLS, *Secretary-Treasurer*

New England Section

RICHARD C. LORD, *President*
WALTER S. BAIRD, *Vice President*
JOHN T. WATSON, *Secretary*
RUSSELL P. MAHAN, *Treasurer*

Chicago Section

PAUL C. FOOTE, *President*
WARREN J. SMITH, *Vice President*
EUGENE PERRINE, *Secretary*
RALPH H. STEINBERG, *Treasurer*

Patrons

AMERICAN OPTICAL COMPANY — BAUSCH & LOMB OPTICAL COMPANY
EASTMAN KODAK COMPANY

Corporation Members

ALLIED CHEMICAL AND DYE CORPORATION, NATIONAL ANILINE DIVISION, Buffalo, New York
AMERICAN CYSTOSCOPE MAKERS, INC., New York, New York
AMERICAN OPTICAL COMPANY, Southbridge, Massachusetts
ARGUS, INCORPORATED, Ann Arbor, Michigan
BAUSCH & LOMB OPTICAL COMPANY, Rochester, New York
BECKMAN INSTRUMENTS, INC., South Pasadena, California
BELL & HOWELL COMPANY, Chicago, Illinois
BELL TELEPHONE LABORATORIES, INC., New York, New York
CORNING GLASS WORKS, Corning, New York
R. R. DONNELLEY & SONS COMPANY, Chicago, Illinois
E. I. DUPONT DE NEMOURS & COMPANY, INC., Chemical Department, Experimental Station, Wilmington, Delaware
E. I. DUPONT DE NEMOURS & COMPANY, INC., Photo Products Department, Parlin, New Jersey
EASTMAN KODAK COMPANY, Rochester, New York
EDMUND SALVAGE COMPANY, Barrington, New Jersey
EDNALITE OPTICAL COMPANY, INC., Peekskill, New York
FAIRCHILD CAMERA AND INSTRUMENT CORPORATION, Jamaica, New York
FARRAND OPTICAL COMPANY, INC., New York, New York
FISH-SCHURMAN CORPORATION, New York, New York
GAERTNER SCIENTIFIC CORPORATION, Chicago, Illinois
GENERAL ELECTRIC COMPANY, Schnectady, New York
W. & L. E. GURLEY, Troy, New York
INTERCHEMICAL CORPORATION, New York, New York
KEUFFEL & ESSER COMPANY, Hoboken, New Jersey
KOLLSMAN INSTRUMENT DIVISION OF SQUARE D COMPANY, Elmhurst, New York
PERKIN-ELMER CORPORATION, Glenbrook, Connecticut
POLAROID CORPORATION, Cambridge, Massachusetts
SIMPSON OPTICAL MANUFACTURING COMPANY, Chicago, Illinois
ARTHUR H. THOMAS COMPANY, Philadelphia, Pennsylvania
WOLLENSAK OPTICAL COMPANY, Rochester 21, New York

THE OPTICAL SOCIETY OF AMERICA was organized in 1916 "*to increase and diffuse the knowledge of optics in all its branches, pure and applied, to promote the mutual interests of investigators of optical problems, of designers, manufacturers and users of optical instruments and apparatus of all kinds and to encourage cooperation among them.*" It aims to serve the interests of all who are engaged in any branch of optics from fundamental research to the manufacture of optical goods.

MEMBERSHIP

Regular Members: "Any person who has contributed materially to the advancement of optics is eligible for regular membership."

Associate Members: "Any person who is interested in optics is eligible for associate membership."

Corporate Members: "Any corporation desirous of encouraging the work of the Society is eligible for corporation membership."

Patrons: The payment, within any one year, of $1000 or more toward the expenses of the Society by any corporation or individual entitles such corporation or individual to the rank of patron.

The Society cordially invites to membership all who are interested in any branch of optics, either in research, in instruction, in optical or illuminating engineering, in the manufacture and distribution of optical goods of all kinds, or in physiological and medical optics.

ANNUAL DUES

Regular members, $10.00; Associate members, $7.50; Corporate members, $75.00. These dues include subscription to the Society's official journal, the *Journal of the Optical Society of America.*

CHANGES OF ADDRESS

All changes of address of members of the Optical Society of America should be communicated to the Secretary, Professor Arthur C. Hardy, Massachusetts Institute of Technology, Cambridge 39, Massachusetts.

Optical Research Laboratory
Qc
350
F17
v. 41

CONTENTS

JANUARY, 1951

Editorial: Journal Format, Ives Medal, Washington Meeting of the Optical Society of America 1
New Johns Hopkins Ruling Engine . . . . . JOHN STRONG 3
Further Study on the Interference Color . . . . . HIROSHI KUBOTA AND TETSUYA ARA 16
Visual Acuity through Various Types and Grades of Sun Glasses . . . . . R. H. PECKHAM 23
Suprathreshold Area Brightness Relationships . . . . . R. M. HANES 28
Design and Performance of a Double-Beam Infrared Spectrophotometer . . . . . FRANK M. RUGG, WILLIAM L. CALVERT, AND JOSEPH J. SMITH 32
Optimum Optical Density in Spectrophotometry . . . . . RICHARD COLE 38
Photographic Granularity and Graininess. V. A Variable-Magnification Instrument for Measuring Graininess . . . . . LOYD A. JONES AND G. C. HIGGINS 41
Electrical Properties of Selenium Coatings . . . . . PAUL H. KECK 53

Technical Notes:

Research Information Bulletin on Optics and Photography 2
Optical Society of America—Local Section News Letter No. 7 2
Colorimetry—A Panel Discussion 2
Inter-Society Color Council to Hold Meeting, February 28, 1951 15
Committee E-12 of ASTM to Hold Meeting 15
Announcement of the Joint Ohio State University-American Physical Society Conference on Molecular Structure and Spectroscopy 27

Letters to the Editor:

Calibration of Infrared Spectrometers . . . . . A. E. MARTIN 56
Improved Slit for a Projection Microphotometer . . . . . J. H. ALTMAN 56
Excitation Spectra of Some Tungstates . . . . . ALEXANDER J. OSZY 57
Note on Quantum Effects in Optics . . . . . U. FANO 58

Book Reviews:

The Autobiography of Robert A. Millikan . . . . . REVIEWED BY ROBERT B. BRODE 59
Grundriss der Photogrammetrie (Fundamentals of Photogrammetry). By K. Schwidefsky. Die Photogrammetrie in ihrer Anwendung auf night-topographischen Gebieten (Applications of Photogrammetry to Non-Topographic Purposes). By Otto Lacmann . . . . . REVIEWED BY IRVINE C. GARDNER 59

Local Section News . . . . . EDITED BY S. S. BALLARD 60

Personalia:

Van Zandt Williams 61
E. C. Crittenden Retires from the National Bureau of Standards 61
Necrology 61

International Commission on Illumination:

U. S. National Committee of the International Commission on Illumination Holds Annual Meeting . 62
Central Bureau of International Commission on Illumination Announces Available Publications . . 62

Technical Calendar 62

FEBRUARY, 1951

Editorial 63
Photographic Granularity and Graininess. VI. Performance Characteristics of the Variable-Magnification Graininess Instrument . . . . . LOYD A. JONES AND G. C. HIGGINS 64
Ten Channel Infrared Spectrograph . . . . . JOHN T. AGNEW, RACHEL G. FRANKLIN, AND ROBERT E. BENN 76
Study of Night Myopia . . . . . M. KOOMEN, R. SCOLNIK, AND R. TOUSEY 80
Low Temperature Raman Cryostat . . . . . WILLIAM J. TAYLOR, A. LEE SMITH, AND HERRICK L. JOHNSTON 91
Theory and Use of the Dioptometer . . . . . HOWARD S. COLEMAN, MADELINE F. COLEMAN, AND DAVID L. FRIDGE 94
Slide Rule for Lighting Calculations . . . . . PARRY MOON AND DOMINA EBERLE SPENCER 98
Visual Sensitivity to Surface Color Differences . . . . . H. R. DAVIDSON 104
Reflecting Microscopes with Spherical Mirrors . . . . . K. P. NORRIS, W. E. SEEDS, AND M. H. F. WILKINS 111
Effect of Varying the Light-Dark Ratio of Intermittent Pre-Exposure upon Subsequent Dark Adaptation in the Human Eye . . . . . F. A. MOTE AND A. J. RIOPELLE 120
Recording Grating Spectrometer with Linear Wavelength Scale . . . . . GEORGE P. KOCH, WILLIAM J. TAYLOR, AND HERRICK L. JOHNSTON 125
Dark Adaptation Level and Duration of Testflash . . . ERNST WOLF AND MICHAEL J. ZIGLER 130
Edge Effect in Phase Contrast . . . . . L. IVAN EPSTEIN 134

Letters to the Editor:

Chamber for Controlled Atmosphere Spectral Excitation . . . . . LOUIS E. OWEN 139

Book Reviews:

Practical Applications of Spectrum Analysis. By Herbert Dingle . . . . . REVIEWED BY NORMAN H. NACHTRIEB 139

Relativity Physics. By W. H. McCrea . . . . . Reviewed by J. Rand McNally, Jr. 140
Photographic Optics. By Allen R. Greenleaf . . . . . Reviewed by R. Kingslake 140

International Commission of Optics . . . . . Edited by S. S. Ballard

International Commission of Optics: Recommendations for the Standardization of Sign Conventions and Symbols in Geometrical Optics, and for the Definition of Refractive Indexes of Optical Glass 140

Technical Calendar 142

Personalia:

Dr. Howard S. Coleman 142

Technical Notes:

American Association of Spectrographers 142
Bibliography on Reflection Optics 142
Kodak Color Handbook 142

March, 1951

Fundamental Research in Atomic Spectra . . . . . William F. Meggers 143
Fundamental Research in Molecular Spectra . . . . . R. W. B. Pearse 148
Spectroscopic Problems of Astronomical Interest . . . . . P. Swings 153
Measurement of Refractive Indexes of Liquids in the Infrared . . . . . Joseph H. Jaffe 166
An *f*:1.0 Camera for Astronomical Spectroscopy . . . Abe Offner and William B. Decker 169
Method for the Determination of Flame Temperature from Emission in the Ultraviolet OH Band . . . . . J. A. Curcio, H. S. Stewart, and C. C. Petty 173
Efficient Grating Mount . . . . . N. A. Finkelstein 179
Computed Aberrations of Spherical Schwarzschild Reflecting Microscope Objectives . . . . . David S. Grey 183
Photographic Granularity and Graininess. VII. Microphotometer for the Measurement of Granularity . . . . . L. A. Jones and G. C. Higgins 192
Evaporated Zinc Sulfide Films . . . . . Joseph L. Rood 201
Designs of Photometer Units for Infrared Spectrographs . . . R. A. Oetjen and L. C. Roess 203

Letters to the Editor:

Radiance Amplification by Multi-Stage Fluorescence System . . . . . W. A. Shurcliff 209
Transmittance of Cesium Bromide Crystals . . . . . Earle K. Plyler and Francis P. Phelps 209
Dark Adaptation . . . . . Albert Rose 210

Book Reviews:

Photographie Instantanée et Cinématographie Ultra-rapide. By P. Fayolle and P. Naslin . . . . . Reviewed by Herbert E. Ives 210
Molecular Spectra and Molecular Structure. By Gerhard Herzberg . . . . . Reviewed by Robert A. Oetjen 211

Local Section News . . . . . Edited by Stanley S. Ballard 211
Technical Calendar 213

Technical Notes:

Physical Society of London Sponsors Thirty-Fifth Annual Exhibiton of Scientific Instruments and Apparatus 152
Infrared Absorption Spectra of Minerals and Inorganic Compounds 213
Course in Infrared Spectroscopy 213
Central Glass and Ceramic Research Institute at Calcutta, India 213
Retinal Camera 214
New Universal Spectrophotometer 214

Personalia:

J. C. Hostetter to Receive Bleininger Award 214
Necrology 214

April, 1951

Mechanical and Thermal Properties of Certain Optical Crystalline Materials . . . . . Lewis S. Combes, Stanley S. Ballard, and Kathryn A. McCarthy 215
Accuracy of Polarization Photometers . . . . . W. H. Steel 223
On the Extension of a System for Differential Correction of Lens Systems to Include Second-Order Terms . . . . . N. J. Rumsey 229
Brightness Relationships for Comfortable Seeing . . . . . Sylvester K. Guth 235
Polarimetric Determination of the Ratio of Complex Reflection Coefficients . . . . . Richard E. Hartman 244
Prism Reflections Aiding Index Measurements . . . . . Frank Mooney 247
New Constant-Deviation Prism Arrangement . . . . . Shoji Makishima, Zyun Koana, and Keichi Oshima 249
Optical Image Transformer . . . . . William Benesch and John Strong 252
Criteria for Pre-Exposure of Spectroscopic Plates . . . . . Lewis M. Branscomb 255
Effect of Phase Changes in White Light Interferometry . . . . . L. G. Schulz 261
Photographic Sharpness and Resolving Power. II. The Resolving-Power Cameras in the Kodak Research Laboratory . . . . . Fred H. Perrin and J. H. Altman 265
Step-Sector in Spectrochemical Analysis . . . . . Ralph E. Thiers 273

Letters to the Editor:

Near-Infrared Spectrophotometry with the Beckman Model DU Spectrophotometer. WILBUR KAYE 277
Precision Alignment in Daylight . . . . . C. FRANX AND A. C. S. VAN HEEL 277
Errata: High Precision Measurements with Simple Equipment . . . . . A. C. S. VAN HEEL 278

Book Reviews:

Les Theories Photochemiques Classiques et Quantiques de la Vision et l'Inhibition Nerveuse en Vision Liminaire (Photochemical Theories, Classical and Quantal, of Vision and Neural Inhibition in Threshold Vision). By Ernest Baumgardt . REVIEWED BY C. G. MUELLER 278
Principles and Practice of Spectrochemical Analysis. By Norman H. Nachtrieb . . . . . REVIEWED BY CHARLES E. HARVEY 279
Optische Messungen des Chemikers und des Mediziners. By Fritz Lowe . . . . . REVIEWED BY WALLACE R. BRODE 279
Lumineszenz. Ergebnisse und Anwendungen in Physik, Chemie und Biologie. By Fritz Bandow . . . . . REVIEWED BY PETER PRINGSHEIM 279
Identification of Molecular Spectra. By R. W. B. Pearse and A. G. Gaydon . . . . . REVIEWED BY G. H. DIEKE 280

Technical Calendar 280

Technical Notes:

Sixth Annual Meeting of the Society for Applied Spectroscopy 281
Polaroid Reporter 281
Semi-Automatic Color Analyzer 281

Personalia:

William F. Meggers Honored 281
Ruby Redford New Editor of *Illuminating Engineering* 281

Optical Society of America, Incorporated, Notice of Election of Officers 281
Physics Abstracts 282
Proceedings of the Winter Meeting of the Optical Society of America 283

MAY, 1951

Dispersion of Air Between 2500A and 6500A . . . . . H. BARRELL 295
Suppression of Certain Parts in Spark Spectra by Electronic Time Switching . . . . . H. M. CROSSWHITE, D. W. STEINHAUS, AND G. H. DIEKE 299
Near Infrared Absorption Spectrum of Liquid Water . . . . . JOSEPH A. CURCIO AND CHARLES C. PETTY 302
Brightnesses of Fine Detail in Air Photography . . P. D. CARMAN and R. A. F. CARRUTHERS 305
Aircraft Camera Mounts—Their Design and Testing . P. D. CARMAN AND R. A. F. CARRUTHERS 311
Relative *f*-Values for Lines of Cr I . . . . . ARMIN J. HILL AND ROBERT B. KING 315
Tristimulus Photometer . . . . . GEORGE C. SZIKLAI 321
Diffraction of Electromagnetic Waves by a Plane Wire Grating . . . . . J. SHMOYS 324
Principle and Adjustment of the Hilger-Müller Double Monochromator . . . . . C. BILLINGTON AND D. A. DAVIES 329
Transmittance of a Prism . . . . . HAROLD F. WEAVER 331
Spectroscopy in Infrared by Reflection and Its Use for Highly Absorbing Substances . . . . . IVAN ŠIMON 336
Test Procedure for Simultaneous Determination of Resolving Power and Image Surface of Fluorographic Cameras . . . . . ERIK INGELSTAM AND PER J. LINDBERG 346
Calculation of the Raman Shift in Vacuum . . . . . ASCHER OPLER 349
Compound Fabry-Perot Interferometer . D. H. RANK, R. P. RUTH, AND K. L. VANDER SLUIS 351
Influence of Surround Brightness and Short Wave Components of Radiation on Dark Adaptation . . . . . MICHAEL J. ZIGLER, ERNST WOLF, AND ESTHER SHORES KING 354

Letters to the Editor:

Metal Grid Interference Filter . . . . . EDWARD A. LEWIS AND JOSEPH P. CASEY 360
Isotope Shifts in Some Lines of Carbon and Nitrogen . . . . . JOHN R. HOLMES 360
Suppression of Line Intensities by Perchloric Acid . . . . . E. E. PICKETT AND GLENN TODD 361
New Image-Converter-Type Tubes for Use with Standard Electron Multiplier Photocells . . . . . MARK E. AMDURSKY, WILLIAM O. REED, AND SERGE PAKSWER 361
An Alignment Chart for Computing the Thicknesses of Evaporated Films . . . . . A. L. SCHOEN AND R. H. DAVIS 362

Book Reviews:

Crystals and the Polarising Microscope. By N. H. Hartshorne and A. Stuart . . . . . REVIEWED BY C. W. MASON 363
Wave Theory of Aberrations. By H. H. Hopkins . . . . . REVIEWED BY M. HERZBERGER 363
Researches in Binocular Vision. By Kenneth N. Ogle . . . . . REVIEWED BY K. B. STODDARD AND MEREDITH W. MORGAN, JR. 363

Local Section News . . . . . EDITED BY STANLEY S. BALLARD 364
Technical Calendar 365

Technical Notes:

Multiple-Beam Interferometry 345
Twelfth Session of International Commission on Illumination 359
Course in Electron Microscopy at Cornell University 365
Meeting of American Crystallographic Association 365
Ohio State University—American Physical Society Symposium on Molecular Structure and Spectroscopy, June 11 to 15, 1951 365

Personalia:

Keiven Burns Honored at the Pittsburgh Conference 366
V. K. Zworykin Awarded Progress Medal by the Society of Motion Picture and Television Engineers 366

JUNE, 1951

Optical Society of America Recognizes the 50th Anniversary of the Founding of the National Bureau of Standards 367
Early Work in Applied Optics at the National Bureau of Standards . . . . E. C. CRITTENDEN 369
Study of Color Centers Produced in Quartz by X-Radiation . . . . . GUY FORMAN 377
Reflection and Transmission Infrared Cells for Use at Liquid Air Temperatures . . . . . L. F. H. BOVEY 381
Xenon Compact Arc Lamps . . . . . WILLIAM T. ANDERSON, JR. 385
Differential Correction of an Optical System . . . . . A. ESTELLE GLANCY 389
Color Change from Daylight to Night Light, Calculated and Observed . . . I. H. GODLOVE 396
Time of Dark Adaptation after Stimulation by Various Brightnesses and Colors . . . . . E. O. HULBURT 402
Spectroscopy from the Point of View of the Communication Theory. Part I. Resolution . . . . . GILBERT W. KING AND A. G. EMSLIE 405
Spectrographic Determination of Halogens and Sulfur in Engine Deposits . . . . . W. O. MANSFIELD, JR., J. C. FUHRMEISTER, AND D. L. FRY 412
Refractive Indices of Rutile and Sphalerite . . . . . J. R. DEVORE 416
Absolute Spectral Diffuse Reflectance of Magnesium Oxide . . . . . W. E. KNOWLES MIDDLETON AND C. L. SANDERS 419

Letters to the Editor:

Measurement of Thin Film Thickness by Interferometry . . . . . S. TOLANSKY 425
Quanta and Visual Thresholds . . . . . M. H. PIRENNE AND E. J. DENTON 426
Transmittance Measurement of Samples of Small Area with the Hardy Recording Spectrophotometer . . . . . FRED J. BAUM 427
Wavelength Calibration in the Infrared by Interference . . . . C. V. COOPER AND J. D. STROUPE 427

Technical Notes:

Course in Modern Industrial Spectrography at Boston College 428
Activities of Spectroscopic Societies 428
National Research Council 429
Polarizing Headlamps 429
Congress on Building Research, London, England 429
Atomic Standards of Length Now Available 429
International Optical Congress Meeting in England 429

Personalia:

James P. C. Southall 430

Technical Calendar 430

Book Reviews:

Engineering Optics. By K. J. Habell and Arthur Cox . . . . REVIEWED BY IRVINE C. GARDNER 430
An Introduction to the Science of Photography. By Katherine Chamberlain . . . . . REVIEWED BY WALLACE R. BRODE 430

JULY, 1951

American Standard Methods of Measuring and Specifying Color 431
Excitation Temperature in Time-Resolved Spectra of Single Condensed Spark Discharges . . . . . LEON BLITZER AND WILLOUGHBY M. CADY 440
Use of "Exploding Wires" as a Light Source of Very High Intensity and Short Duration . . . . . WILLIAM M. CONN 445
Photoelectric Measurement of Fluorescence Spectra of Highly Colored Liquids . . . . . J. L. LAUER AND E. J. ROSENBAUM 450
Achromatic Doublet of Silicon and Germanium . . . . . R. G. TREUTING 454
Graphical Ray-Trace and Surface Generation Methods for Aspheric Surfaces . . . . . ROBERT E. LEWIS 456
Some Geometrical Factors in Light-Scattering Apparatus . J. J. HERMANS AND S. LEVINSON 460
Spark Analysis of Semi-Microsamples . . . . . W. J. WARK 465
Static Multislit Spectrometry and Its Application to the Panoramic Display of Infrared Spectra . . . . . MARCEL J. E. GOLAY 468
Brightness and Polarization of the Daylight Sky at Altitudes of 18,000 to 38,000 Feet above Sea Level . . . . . D. M. PACKER AND C. LOCK 473
Studies of Rod-Process by Polarization Method . . . . . K. MOTOKAWA, M. EBE, Y. ARAKAWA, AND T. OIKAWA 478

Letters to the Editor:

Cyanogen Rarefaction Using Solid CO_2 . . . . . W. J. WARK 482
Correction for Light Absorption in Fluorescence and Light Scattering Measurements . J. L. LAUER 482
Nomogram for Estimating the Optimum Aperture of Optical Systems . . . . . F. I. HAVLIČEK 483

Book Reviews:

Technical Optics, Volume II. By L. C. Martin . . . . . Reviewed by R. E. Stephens 484
The Perception of the Visual World. By James J. Gibson . . . Reviewed by Samuel Renshaw 484
Spectrochemical Analysis. By L. H. Ahrens . . . . . Reviewed by Wallace R. Brode 485
Advances in Electronics, Volume II. By L. Marton, Editor . . . Reviewed by J. W. Beams 485

International Commission of Optics . . . . . Edited by Stanley S. Ballard 486
Technical Calendar 486

Technical Notes:

International Conference on Light 487
Conference on Photographic Emulsions to be Held in Paris 487
National Technical Conference on Lighting 487
Conference on Auroral Physics 487
Symposium on Optical Image Evaluation 487
Chicago Meeting of the Optical Society of America, October 23, 24, and 25, 1951 488

Personalia:

Glenn A. Fry Honored by Optometry Fraternity at Ohio State University 488

Minutes of the Thirty-Seventh Meeting of the Board of Directors of the Optical Society of America, Incorporated 489
Annual Report of the Editor of Publications 489
Annual Report of the Secretary of the Optical Society of America, Inc., for the Calendar Year, 1950 490
Annual Report of the Treasurer of the Optical Society of America, Inc. 492

August, 1951

Interferometric Calibration of Precision Screws and Control of Ruling Engines . . . . . George R. Harrison and James E. Archer 495
Shape of Reflected Interference Fringes from Interferometers Coated with Thin Metal Films . . . . . J. Holden 504
Five-Inch Molded Silver Chloride Correctors for a Kellner-Schmidt System . . . . . J. C. Evans and T. A. King 510
Variation in the Horizontal Distribution of Light from Candlepower Standards . . . . . W. E. Knowles Middleton and Eleanor G. Mayo 513
On the Resolving Power of the Human Eye . . . . . Kenneth N. Ogle 517
Psychophysical Study of White. I. Neutral Adaptation . . . . . Leo M. Hurvich and Dorothea Jameson 521
Psychophysical Study of White. II. Neutral Adaptation. Area and Duration as Variants . . . . . Dorothea Jameson and Leo M. Hurvich 528
On the Sensitive Color of Chromatic Polarization . . . . . Hiroshi Kubota, Tetsuya Ara, and Hiroyoshi Saito 537
Infrared Microspectroscopy. II . . . . . Elkan R. Blout and George R. Bird 547
Color Tolerance Specifications for Paint . . . . . Thomas F. Boyd 552

Letters to the Editor:

Fine Structure in the Emission Spectrum of Manganese Activated Zinc Silicate . . . C. C. Vlam 558
Test for Fluorescence . . . . . A. di Bernardo and J. E. Tyler 558
Transparent Luminescent Films . . . . . F. J. Studer, D. A. Cusano, and A. H. Young 559
Electronic Computation of Wave Numbers . . . . . G. K. Werner, J. R. McNally, Jr., and Phyllis C. Johnson 559
Note on Optimum Transmittance in Spectrophotometry . David Z. Robinson and Richard Cole 560
Note on Intermediate Intensity Reciprocity-Law Failure at and Near the Optimum in Photographic Exposure . . . . . Shin Fujisawa and Eiichi Mizuki 560

Book Reviews:

Progress in Photography 1940–1950. By D. A. Spencer . . . . Reviewed by Wallace R. Brode 561
Ophthalmic Dispensing. By Russell L. Stimson . . . . . Reviewed by Kenneth N. Ogle 562
Photography in Astronomy. By E. W. H. Selwyn . . . . . Reviewed by Leo Goldberg 562

Local Section News . . . . . Edited by Stanley S. Ballard 563

Personalia:

Halweck Prize and Medal to Sir Thomas Merton 563
Marcel J. E. Golay Awarded the Harry Diamond Memorial 564
Paul D. Foote Honored 564
Necrology 564

Technical Notes:

International Union of Pure and Applied Physics—International Astronomical Union (IUPAP-IAU) Joint Commission for Spectroscopy 564
International Spectroscopic Organizations 565
Research Conference on Vision 565
Bausch & Lomb Optical Parts Catalog 565
American Institute of Physics Style Manual 566

Technical Calendar 566

SEPTEMBER, 1951

Editorial—American Institute of Physics Style Manual 567
Style Manual . . . . . AMERICAN INSTITUTE OF PHYSICS 568
New Resolving Power Test Chart . . . . . F. E. WASHER AND F. W. ROSBERRY 597
Spurious Resolution of Photographic Lenses . . . . . ROBERT N. HOTCHKISS, FRANCIS E. WASHER, AND FRED W. ROSBERRY 600
Reflection and Transmission of Radiation by Metal Films and the Influence of Nonabsorbing Backings . . . . . LOUIS HARRIS, JOHN K. BEASLEY, AND ARTHUR L. LOEB 604
Influence of Visual Adaptation on Loci of Constant Hue and Saturation . DAVID L. MACADAM 615
Formation of Molecular Helium in a Glow Discharge . . . . . W. D. PARKINSON 619
Munsell Color Book in Textiles . . . . . H. R. DAVIDSON AND H. LUTTRINGHAUS 623
Incandescent Tungsten Source for Infrared Spectroscopy . . . . . J. H. TAYLOR, C. S. RUPERT, AND JOHN STRONG 626
Optical Calculations with Automatic Computing Machinery . . . . . DONALD P. FEDER 630
Ray Tracing Using the IBM Card Programmed Electronic Calculator . . . . . WILLIAM A. ALLEN AND RICHARD H. STARK 636
Photoelectric Setting Device for a Spectrum Plate Comparator . . . . . FRANK S. TOMKINS AND MARK FRED 641

Letters to the Editor:

Thermoluminescence of Zinc Silicate Phosphors Activated with Manganese and Arsenic . . . . . J. R. NELSON AND J. H. BERBERT 644
Algebraic Prism Formula Applicable to Lenses . . . . . FRANK MOONEY 644
On Underwater Photography . . . . . A. IVANOFF 645
Igniting an Arc for Spectrographic Analysis in Vacuum . . . . . A. J. MITTELDORF 646
New Approach in the Analytical Study of the Spherical Aberrations of Any Order . JEAN LEFAIVRE 647

Book Reviews:

Bibliography of Electron Microscopy. By V. E. Cosslett . . . . . REVIEWED BY L. MARTON 648
Experimental Spectroscopy. By Ralph A. Sawyer . . . . . REVIEWED BY WALLACE R. BRODE 648

Technical Notes:

Electrophoresis Apparatus 648
Corning Glass Center 649
Federal Color Card for Paint 649
Conference on Molecular Structure and Spectroscopy—Dedication of New Buildings at Ohio State University 652
American Institute of Physics Placement Service Register 653
Glass Technology Conference in Germany 653

Personalia:

Herbert E. Ives 653
William F. Meggers 653
Edwin H. Land 653
Edward U. Condon 653
Necrology 654

Technical Calendar 654

OCTOBER, 1951

Editorial—Cooperation in the Applied Optics Fields of Ophthalmology, Optometry, and Opticianry 655
Modification of a Beckman Model DU Spectrophotometer for Automatic Operation at 210–2700 mμ . . . . . WILBUR KAYE, CHAM CANON, AND R. G. DEVANEY 658
Fast-Scanning Infrared Recording Spectrometer . . . . . P. J. WHEATLEY, E. R. VINCENT, D. L. ROTENBERG, AND G. R. COWAN 665
Infrared Reflectometer . . . . . MAX S. OLDHAM 673
Anisopia and Perception of Space . . . . . PAUL A. CIBIS AND HEINZ HABER 676
Influence of Luminance Level on Visual Sensitivity to Color Differences . . W. R. J. BROWN 684
Scintillation of Starlight . . . . . A. H. MIKESELL, A. A. HOAG, AND JOHN S. HALL 689
Monochromator for the Vacuum Ultraviolet . . . . . R. TOUSEY, F. S. JOHNSON, JOHN RICHARDSON, AND NESTOR TORAN 696
Thermocouple Measurements of Spectral Intensities in the Vacuum Ultraviolet . . . . . DONALD M. PACKER AND CHARLES LOCK 699
Fluorescent Sensitized Photomultipliers for Heterochromatic Photometry in the Ultraviolet . . . . . F. S. JOHNSON, K. WATANABE, AND R. TOUSEY 702
Gas Transport Electrodes . . . . . LOUIS E. OWEN 709
Multiple Reflection Raman Tubes for Gases . H. L. WELSH, C. CUMMING, AND E. J. STANSBURY 712
Impedance Concept in Thin Film Optics . . . . . PAUL J. LEURGANS 714
Determination of the Distribution of Electron Trapping States in Phosphors . . . . . C. BULL AND D. E. MASON 718
On the Final Correction of Geometrical Aberrations . . . . . C. MOSER 727

Letters to the Editor:

Optical Constants of Germanium, Silicon, and Pyrite in the Infrared . . . . . IVAN ŠIMON 730
Mercuric Tungstate Phosphor . . . . . FRANK E. SWINDELLS 731

Gamma-Nomograph . . . . . EDWIN S. HODGE 731
Structure of the Photographic Latent Image . . . . . R. DEBOT 732
Image Slicer for Raman Spectroscopy . . . . . JOHN U. WHITE 732

Book Reviews:

Photometry and the Eye. By W. D. Wright . . . . . REVIEWED BY RAY P. TEELE 733
From the Life of a Researcher. By William W. Coblentz . . REVIEWED BY WALLACE R. BRODE 733

International Commission of Optics . . . . . EDITED BY STANLEY S. BALLARD 733
International Commission on Illumination 734

Technical Notes:

Physics Abstracts 695
New Developments in England in Diffraction Grating Ruling 738
Infrared Spectra of Phosphorus Compounds 740
Jubilee of the National Physical Laboratory 1900–1950 740
International Commission on Glass 740
Trade Publications 741
Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy 741

Technical Calendar 741

Personalia:

Professor Tolansky Introduces Multiple Beam Interferometry in the U. S. 742

Errata 742

NOVEMBER, 1951

Effect of Duration of Onset and Cessation of Light Flash on the Intensity-Time Relation in the Peripheral Retina . . . . . GEORGE E. LONG 743
Use of the Herschel Effect in Improving Aerial Photographs . . . . . MARY JOHNSON 748
New Criteria for Contact Printing in Aerial Photography . . . . . L. E. HOWLETT AND D. L. MATTHEWS 752
Improved Color-Difference Formula, with Applications to the Perceptibility and Acceptability of Fadings . . . . . I. H. GODLOVE 760
Gross Variations in the Physical Properties of Synthetic Crystalline Lithium Fluoride . . . . . STANLEY S. BALLARD, LEWIS S. COMBES, AND KATHRYN A. MCCARTHY 772
Ruling of Diffraction Gratings at the Mount Wilson Observatory . . . . . HAROLD D. BABCOCK AND HORACE W. BABCOCK 776
Psychophysical Study of White. III. Adaptation as Variant . . . . . LEO M. HURVICH AND DOROTHEA JAMESON 787
Ultraviolet Spectral Sensitivity Characteristics of Photomultipliers Having Quartz and Glass Envelopes . . . . . L. DUNKELMAN AND C. LOCK 802
Some Remarks on Ray Tracing . . . . . M. HERZBERGER 805
Thin Sheet Plastic Fresnel Lenses of High Aperture . . . . . O. E. MILLER, J. H. MCLEOD, AND W. T. SHERWOOD 807
Low Temperature Luminescence of Inorganic Solids . . . . . CLIFFORD C. KLICK 816
Ambient Temperature Independent Thermopiles for Radiation Pyrometry . WILLIAM G. FASTIE 823
Experimental Color Comparator . . . . . ELLWOOD J. KING AND DONALD S. RODBELL 830
Infrared Absorption and Reflection Spectra of the Ammonium Halides . . . L. F. H. BOVEY 836
Design and Construction of Fresnel Optics for Photoelectric Receivers . . . . . E. A. BOETTNER AND N. E. BARNETT 849
Notes on the Multiple Source Schlieren System . . . . . RALPH A. BURTON 858

Book Reviews:

An Essay on Binocular Vision. By Lord Charnwood . . . . . REVIEWED BY PAUL BOEDER 860
Optics. By Arthur Linksz . . . . . REVIEWED BY STANLEY S. BALLARD 860

Letters to the Editor:

Nomographs for Converting between Hunter Color Difference Meter Readings and I.C.I. Color Co-ordinates . . . . . F. W. BILLMEYER, JR. 860
On the Stokes Parameters for Polarized Radiation . . . . D. L. FALKOFF AND J. E. MACDONALD 861
On the Criteria for Pre-Exposure of Spectroscopic Plates . . . . . MILTON GREEN 862
Criteria for Pre-Exposure of Spectroscopic Plates . . . . . LEWIS M. BRANSCOMB 862

Technical Notes:

Optical Society of America Recognizes the Diamond Jubilee of the American Chemical Society . . 863
A New System of Lenses of Variable Power 863
Guide for Measurement of Color 864
Calco Technical Bulletin 864
National Research Council Establishes a Committee on Infrared Absorption Spectra 864
Applied Research Laboratories 865

Technical Calendar 865

Personalia:

Robert E. Bannon 865
Henry M. O'Bryan 865
Mellon Receives Fisher Award 865

Proceedings of the Thirty-Sixth Annual Meeting of the Optical Society of America 866

DECEMBER, 1951

The Frederic Ives Medal for 1951 . . . . . Frontispiece
Brian O'Brien, Frederic Ives Medalist for 1951 879

Symposium on Vision
Vision and Resolution in the Central Retina . . . . . BRIAN O'BRIEN 882
Recent Concepts of Retinal Color Mechanism. I. Contributions from Psychophysics . . . . . S. A. TALBOT 895
Recent Concepts of Retinal Color Mechanism. II. Contributions from Anatomy and Physiology . . . . . S. A. TALBOT 918
Influence of the State of Accommodation on the Visual Performance of the Human Eye . . . . . JOSÉ M. OTERO 942
Photochemical Basis of Rod Vision . . . . . GEORGE WALD 949

Symposium on Polarization
Some Aspects of the Development of Sheet Polarizers . . . . . EDWIN H. LAND 957
Some Polarization Measurements in Astronomy . . . . . JOHN S. HALL 963
Monochromatic Depolarizer . . . . . BRUCE H. BILLINGS 966
On the Properties of Polarization Elements as Used in Optical Instruments. I. Fundamental Considerations . . . . . C. D. WEST AND R. CLARK JONES 976
On the Properties of Polarization Elements as Used in Optical Instruments. II. Sinusoidal Modulators . . . . . R. CLARK JONES AND C. D. WEST 982
Optical Rotation of Polarized Light by Chemical Compounds . . . WALLACE R. BRODE 987
On the Measurement of "Daylight Fluorescent" Materials . . . . . JOHN E. TYLER AND FRANCIS P. CALLAHAN, JR. 997
Grating Spectrophotometer for the Ultraviolet and Visible Regions . . . . . T. B. THOMAS AND E. E. SCHNEIDER 1002
Method of Calibrating an Infrared Prism Spectrometer . . . W. L. ROSS AND D. E. LITTLE 1006
Variation of Critical Fusion Frequency with Brightness at Various Retinal Locations . . . . . RICHARD THOMAS BROOKE 1010
Possible Extension of the Density-Difference Method of Spectrographic Analysis . . . . . B. VERKERK 1017
Distortion of the Image by Prisms . . . . . KENNETH N. OGLE 1023
Control of Petzval Curvature . . . . . W. WALLIN 1029
Differential Refractometer . . . . . B. A. BRICE AND M. HALWER 1033
Studies in the Resolving Power of Photographic Emulsions. III. The Effect of the Relative Aperture of the Camera Lens on the Measured Value . . . . . FRED H. PERRIN AND J. H. ALTMAN 1038
Interferometric Method for the Determination of the Absorption Coefficients of Metals, with Results for Silver and Aluminum . . . . . L. G. SCHULZ 1047
Calculation of Color Differences from Visual Sensitivity Ellipsoids . . . . H. R. DAVIDSON 1052

Letters to the Editor:
On the Number of Absolutely-Identifiable Spectral Hues . . RITA M. HALSEY AND A. CHAPANIS 1057
On Simple Sky Lenses . . . . . F. I. HAVLIČEK 1058
Astigmatism of a Multiple Path Absorption Cell . . . . . T. R. REESOR 1059
Ordinate Printing Attachment for the G. E. Recording Spectrophotometer . . . . O. E. MILLER 1060
Metallurgical Microspectroscopy using Microdrills . . . . . FORD R. BRYAN 1061
Accommodation and Night Myopia . . . . . JOSÉ M. OTERO AND M. AGUILAR 1061
New Data on the Thermal Conductivity of Optical Crystals . . . . . KATHRYN A. MCCARTHY AND STANLEY S. BALLARD 1062
Thallium Bromide-Iodide (KRS-5) as an Infrared Polarizer . R. T. LAGEMANN AND T. G. MILLER 1063

Book Reviews:
Modern Interferometers. By C. Candler . . . . . REVIEWED BY WILLIAM F. MEGGERS 1064
Crystal Growth. By H. E. Buckley . . . . . REVIEWED BY H. C. KREMERS 1064
Eyes and Industry. By Hedwig S. Kuhn . . . . . REVIEWED BY FRANK PAYNE 1065

Technical Notes:
From "Sand" to "Maize" to "Jasmine" 1065
American Society for Testing Materials Planning a Fiftieth Anniversary Meeting 1066
American Optical Company Produces Image Correcting Lens for Television Projection 1066
Corning Glass Announces New Photosensitive Glass 1066
Inter-Society Color Council—I.S.C.C. Plans Meeting in February, 1952 1066
British Bulletin of Spectroscopy 1067
Society for Applied Spectroscopy 1067
Molecular Spectroscopy in Basel 1067
Science of Color-Publications Arrangements Completed for Colorimetry Committee Report . . . 1068

Personalia:
Paul E. Klopsteg 1068
Robert A. Woodson 1068
John A. Schuch 1068
Necrology 1068

Technical Calendar 1069

Minutes of the Thirty-Eighth Meeting of the Board of Directors of the Optical Society of America, Incorporated 1070

Errata 1071

Author Index to Volume 41 1073

Annual Subject Index to Volume 41 1080

Volume Table of Contents III